

P-SCHILL-001/WO

**CLAIMS**

1. A process for the manufacture of intermediate food products in the form of hydrated concentrates of myofibrillar proteins from fish flesh, said process comprising the following steps in succession in the order shown:
  - 5 - first of all, an initial pulp (B) of minced fish flesh is prepared (1) from fish fillets (A);
  - said initial pulp is then washed (2) with water (C) to obtain a washed pulp (H) containing a residual fraction of lipids and sarcoplasmic proteins comprised between 0.1 and 3% of the weight of the pulp;
  - 10 - said washed pulp (H) is then refined in the wet state (3) by removing a fraction of impurities (K);
  - the refined pulp (J) is then mixed (4) until it is in the form of a homogeneous emulsion (L);
  - the emulsified pulp (L) is then drained (6) to produce a densified pulp (O);
  - 15 - cryoprotectants (Q) are then added (7) to the densified pulp (O) to form a final pulp (R) suitable for freezing;
  - the final pulp (R) is then packaged (8) in the form of blocks (S);
  - and said blocks (S) are frozen (9).
- 20 2. The process as claimed in claim 1, characterized in that the pulping operation (1) is coupled with the addition of water.
3. The process as claimed in claim 2, characterized in that the water is added in a ratio of at least one volume of water to three volumes of pulp.
- 25 4. The process as claimed in claim 1 or 2, characterized in that the pulping operation (1) is carried out as a function of a density gradient of the material.

5. The process as claimed in claim 1, characterized in that the washing operation (2) is composed of the following steps:

- water (C) is added to the initial pulp (B) and the whole is mixed (10) to form a water-pulp mixture (E);
- 5 - the water-pulp mixture (E) is centrifuged (11) and the resulting water (G) is removed;
- and the centrifuged pulp (F) is washed continuously (12) with water (C).

6. The process as claimed in claim 5, characterized in that, in the  
10 centrifugation step (11), the volume of water removed (E) is between 80 and 95% of the volume of water initially used.

7. The process as claimed in claim 1, characterized in that the  
15 mixing operation (4) is carried out until the homogenized pulp (L) is in the form of an emulsion with a stability of more than 10 minutes.

8. The process as claimed in claim 1, characterized in that the  
20 mixing step (4) is followed by a deodorization (5) of the emulsified pulp (L) in which the latter is evacuated.

9. The process as claimed in claim 1, characterized in that the  
operation (6) for draining the emulsified pulp (L) is carried out by centrifugal decantation.

25 10. The process as claimed in claim 1, characterized in that the final pulp (R) is subjected to a cold extrusion operation (7) during addition of cryoprotectants (Q).

11. An installation for carrying out the process as claimed in claim 1,  
30 characterized in that it comprises the following elements successively assembled in series in the order shown:

- a pulping device (101) also provided with a waste recovery trough (139);

- a pulp washing device (102) provided with a system for discharging the wash waters;
- a pulp refining device (103) provided with a system (142) for discharging the fraction removed (K);
- 5 - a continuous pulp mixing device (104);
- a pulp draining device (106) provided with a system (143) for discharging the liquid fraction (P);
- a device (123) for adding cryoprotectants (Q) to the pulp;
- a device (108) for forming the pulp into blocks (S);
- 10 - and a device (109) for freezing the blocks (S).

12. The installation as claimed in claim 11, characterized in that the pulp pulping device (101) consists of a cylindrical sieve having perforations of different diameter according to a linear gradient ranging from 0.2 to 0.4 mm, and of a variable-pitch endless screw conveyor placed inside said sieve, which is provided upstream with a hopper.

13. The installation as claimed in claim 11, characterized in that the washing device (102) consists of the following elements successively assembled in series:

- a refrigerated double-chamber tank (110) equipped with a pipe for the optional addition of water (C) and with mixing equipment;
- a screen centrifuge (111);
- and a continuous washing device (112) consisting of a refrigerated double-chamber cylindrical tank equipped with a pipe for the addition of water, and with mixing equipment.

14. The installation as claimed in claim 11, characterized in that the pulp mixing device (104) is a static continuous mixer of the LPD (low pressure drop) type.

15. The installation as claimed in claim 11, characterized in that it also

comprises a deodorization device (105) located behind the mixing device (104).

16. The installation as claimed in claim 11, characterized in that the pulp draining device is a centrifugal decantation device (106).

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17. The installation as claimed in claim 11, characterized in that it also comprises a cold extrusion device (107) allowing the addition (123) of cryoprotectants (Q).

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18. The installation as claimed in claim 11, characterized in that the cold extrusion device (107) consists of the following elements successively assembled in series:

- a conveyor of the hooded screw conveyor type (113);
- a controlled-throughput ram (114);
- 15 - and a double-screw extruder (115) equipped with means (126) for monitoring and regulating the pressure.

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19. Surimi-base and other intermediate food products obtained from oily fish by the process as claimed in claim 1, characterized in that the residual fat content is between 0.1 and 1.5%.

20. Surimi-base and other intermediate food products as claimed in claim 19, characterized in that the oily fish are sardine, scad, mackerel or sardinella.